INDUSTRIES OF INFRASTRUCTURAL FUTURES, AUTOMATED CULTURES, AND ALGORITHMIC DYNAMICS

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Panel Abstract

We approach the conference topic of industry through three studies that explore a new media landscape where value and power are increasingly produced through the operalisation of machinic and affective relations and subjectivities. We explore technologies of automation, artificial intelligence and algorithmic regimes and the new possibilities for enacting and imagining political futures that they afford. The papers focus on three case studies: WeChat posts related to the Australian referendum for Indigenous voice to Parliament; perceptions of bias in texts generated by ChatGPT; and time synchronisation protocols used in industrial warehouses. These three cases reveal the ways in which automated media technologies enable complex interactions between humans and machines that impact practices of political subjectification, trust and notions of truth, and weave a particular relationship between affect, media interfaces and algorithms.

The panel analyses the role of networks and algorithms in shaping the parameters of emerging forms of expression and participation that are enacted through the interrelation between users and digital platforms. The three papers adopt a platform- and infrastructure-specific research approach, building on research into the infrastructural turn in media studies (Plantin and Punathambekar 2019). Seeing media infrastructures as a complex arrangement of digital platforms, databases, algorithms and protocols, we look at the political effects produced by these infrastructures. These effects are analysed in their material situatedness in the logic of the particular digital platform.

In their paper, Toija Cinque and Allan Jones illuminate the interplay between AI agency, human cognition, and digital media platforms, thereby contributing to discourse on ethical AI use, sociotechnical systems, and information integrity in the digital age. Their paper explores the interconnections between generative AI, digital platforms, and cognitive biases, striving to deepen our understanding of technology's capacity to engender a truth-centric, empathetic digital society. By delineating ethical pathways for the coexistence of humans and machines within the information realm, the study aims to contribute significantly to the ongoing discourse surrounding ethical AI use, the development of sociotechnical systems, and the maintenance of information integrity in the digital era. Through its findings, it aspires to influence future technological developments, regulatory frameworks, and policy formulations, thus paving the way for a more balanced and equitable digital future.

Fan Yang, Robbie Fordyce and Luke Heemsbergen analyse messages related to the recent referendum for political representation of Indigenous Australians posted on the Chinese-owned platform WeChat. The authors argue that, while posts largely follow the rhetoric of mainstream Australian media in their sentiments, the cases in which they divert, indicate the catalyzation of diaspora affects which influence the position towards race and Indigenous issues.

Tsvetelina Hristova explores the technopolitical implications of network time synchronisation protocols in automation. The logic of digital infrastructures imposes a notion and practice of time that is radically different from the universalising time synchronisation of industrial capitalism. Instead, network time protocols rely on the exchange of messages and data packages through which a measure and notion of time is negotiated and agreed upon in a networked environment. This imposes a particular technopolitical context of technological interpellation where structures of time are constituted through the participation of nodes in the network and in which the operative visuality of sensors and image data reconstitute relations of hierarchies and enclosures.

This panel is proposed by members of two research groups on critical infrastructure studies across the Atlantic that explore how new digital, automated and intelligent media technologies are impacting social and political life. Trying to understand criticality as both an analytical approach and a characteristic of the objects we research, we interrogate the aspects of digital media infrastructures that add new layers to how

datafication acquires subtle cultural and technopolical inflections. Through the focus on affect in the panel, understood as both social emotional charge (Ahmed 2013) and as the potential for connection and interaction (Massumi 2002) in the network, we try to see the infrastructure of data systems and automated platforms as the product of different cultural, political and technological drives. These drives give rise to situated and embodied logics of automation that are platform-dependent but also dependent on cultural and social affects imbued through their provenance, producers and users. The panel blends different disciplinary perspectives and approaches, seeking a dialogue between media and communication studies, cultural studies and critical art research.

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EMPATHY AND DE-BIASING THROUGH GENERATIVE AI: NAVIGATING COGNITIVE BIASES, FAKE NEWS, AND SOCIO-TECHNICAL AGENCY IN THE DIGITAL MEDIA LANDSCAPE

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A Critical Examination of AI's Role in Cognitive Bias Mitigation and Information Integrity

In an era defined by pervasive digital information, AI systems have become integral to curating and amplifying content tailored to user preferences (Tufchi, Yadav & Ahmed, 2023; Wardle & Derakhshan, 2017). While these systems facilitate personalized engagement, they also exacerbate cognitive biases (Sunstein, 2017; Bruns, 2019; Zollmann, et al., 2021), reinforce filter bubbles, and propagate misinformation (Pariser, 2011; Allcott & Gentzkow, 2017). These dynamics undermine information integrity and hinder empathetic engagement by entrenching polarization. The rise of hyper-industrialization and Human-Machine Interaction (HMI) further complicates this landscape, with generative AI models—particularly Large Language Models (LLMs)—reshaping how information is curated and consumed (Brynjolfsson & McAfee, 2014). Generative AI models, particularly Large Language Models (LLMs), enhance human cognition by reshaping how information is curated and consumed, thereby creating new socio-technical dynamics that may also shape biases and empathetic interactions (Brown et al., 2020). Socio-technical agency, in this context, refers to the ability of AI and digital platforms to influence and co-construct human behaviour, decision-making, and societal dynamics through their design and operational features. While generative AI has the potential to mitigate biases and foster empathy by exposing users to diverse perspectives and enabling nuanced discourse, its impact remains insufficiently explored, particularly in regions with limited technological infrastructure (Caliskan, Bryson & Narayanan, 2017), particularly in regions with limited technological infrastructure or representation in digital media research. This study employs the Media Ecology framework to analyze how generative AI, as an extension of human cognition, reshapes information flow and influences cognitive biases and empathy (Postman, 2000). This lens contextualizes AI's role within broader socio-technical and communicative ecosystems. Specifically, this study critically examines the relationship between what users are exposed to via AI-driven content to speculate on the mechanisms through which generative AI might reduce biases, promote empathy, and ensure accuracy in digital media. By investigating user interactions with LLMs, the research seeks to uncover how these technologies can navigate the complex interplay of cognitive biases, fake news, and socio-technical agency to promote more inclusive and balanced digital ecosystems.

Contextualizing the Digital Quandary

Digital narratives—interactive storytelling constructs combining text, visuals, audio, and algorithmically curated content—amplify cognitive biases by reinforcing predispositions and intensifying distortions in judgment through personalization and platform design. This interplay between AI, human cognition, and digital platforms demands a robust methodological approach to disentangle the complex dynamics and provide actionable insights. This study adopts a mixed-methods design, integrating qualitative and quantitative data, to capture user experiences with LLMs in underrepresented regions. By focusing on diverse contexts, the research ensures a comprehensive examination of how generative AI influences information integrity—defined as the accuracy, reliability, and diversity of information—and empathetic interactions, addressing global inequities in digital media research.

Methodology

New Artificial Intelligence (AI) models have become highly effective in delivering content that fuels perpetual user engagement and platform growth, however, the governance of their information dissemination in the interest of the wellbeing of participants is crucially neglected. Many users are afforded only crude means by which to exercise their own agency in navigating the landscape. The exploration of the role and impact of AI, particularly in the domain of mitigating biases and fostering empathy in digital information landscapes, often tends, however, to be concentrated in regions with advanced technological infrastructures and capacities, such as the United States, the European Union, China, and other technologically advanced nations. Consequently, several countries and regions may be underrepresented in this realm of research, particularly those in Africa, Southeast Asia, Central Asia, and South America—this was our focus. This research prioritizes underrepresented regions to develop strategies and policies that address unique local challenges, fostering globally equitable digital ecosystems.

Method

Adopting a mixed-methods approach enables a comprehensive analysis of user interactions with AI, capturing both the systemic impacts of cognitive biases and the user-level experiences that shape information integrity. Information integrity here refers to the accuracy, reliability, and diversity of information disseminated through AI systems. We draw on qualitative and quantitative data from 580 international participants from across three regions in the Global South in five countries about their experience, access and use of LLMs such as ChatGPT-4 using the survey instrument *Perceptions of Generative AI in Underrepresented Regions: Uptake and Use Survey* with 20 Quantitative and 7 Qualitative questions. The sample comprises responses from (1) Africa: South Africa; (2) Southeast Asia: Indonesia, India, and the Philippines, and; (3) South America: Brazil.

In the context of the literature cited above, our aim is to surface the implications and emotional effects of technology-driven information delivery, shedding light on the potential and pitfalls of employing Large Language Models (LLM) such as generative AI (GenAI) in navigating the complex digital media environment.

H1: Understanding individuals as networked users and customers through their engagement with generative AI offers new opportunities to mitigate biases and foster empathetic interactions in digital spaces.

RQ1: How do generative AI systems influence user exposure to diverse information, and what biases emerge in their content delivery?

RQ2: What are the measurable impacts of generative AI on cognitive biases, emotional engagement, and user perceptions of information integrity in digital environments?

RQ3: What mechanisms in generative AI deployment influence user well-being and how are these perceived across different contexts?

The paper provides empirical insights meant to inform ethical guidelines, regulatory policies, and developmental frameworks for leveraging AI in mitigating cognitive biases, fostering empathy, and ensuring veracity in digital information landscapes.

Discussion and Recommendations

This research intricately explores the interconnections between generative AI, digital platforms, and cognitive biases, striving to deepen our understanding of technology's capacity to engender a fair and empathetic digital information environment. We present six key recommendations based on user interactions in the Global South with AI-driven digital platforms. First, our findings show that a number of participants from underrepresented regions perceive algorithmic curation as a barrier to encountering opposing views, underscoring the need for platform designs that promote respectful engagement. Second, enhancing digital literacy is essential for consistent fact-checking in environments prone to misinformation. Third, further research is needed to validate self-reported behaviours and strengthen digital literacy efforts. Fourth, ongoing investigation into content diversity and algorithmic curation is necessary. Fifth, clearer platform policies are required to guide users through AI's growing influence. Finally, increased transparency in content algorithms is critical to understanding how personalisation may limit exposure to diverse perspectives. By delineating ethical pathways for the coexistence of humans and machines within emerging information spheres, the study aims to contribute significantly to the ongoing discourse surrounding ethical AI use, the development of sociotechnical systems, and the maintenance of information integrity in the digital era. By focusing on underrepresented regions, this research challenges the predominantly Western-centric narratives in AI studies, offering a globally equitable perspective on the ethical use of generative AI. Through its findings, this study aspires to influence future technological developments, regulatory

frameworks, and policy formulations, thus paving the way for a more balanced and equitable digital future.

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AFFECT INFRASTRUCTURES OF POLITICAL COMMUNICATION: WECHAT AND THE 2023 AUSTRALIAN INDIGENOUS VOICE REFERENDUM

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Introduction

The language barrier, platform-politics linked to Australia's geo-politics, and domestic political speech have made visible for study what might be described as neocolonial information infrastructure: WeChat in Australia offers an intermediary industry of political communication operated by Chinese-language ethnic media outlets. These outlets promote political campaigns for Australian parties or candidates, driven by business imperatives, without adhering to Australian electoral or media regulations (Yang et al., 2024). Manipulating affect is central to their strategy, generating clicks that attract political ads and sponsored content which often yield higher revenue than conventional commercial ads (Coleman, 2018; Yang, 2023).

We are interested in examining how Australian political actors, WeChat's platform economy, and diasporic media outlets collectively shape the Chinese ethnic media industry into an affective infrastructure for political communication and exploring its implications for the vitality of the Chinese-speaking online public sphere. We employ WeChat's coverage of the 2023 Australian Indigenous Voice to Parliament Referendum as a case study and ask:

- Which domestic and international actors used WeChat to shape discussions on The Voice, and what platform features supported this engagement?
- How did WeChat content reflect support or opposition to the referendum?
- Was misinformation observed, and what insights can inform (monitoring) political communication on WeChat or other "alternative" social media for the 2025 Australian federal election?

Research context

This study fills in a research and regulatory gap where Australian electoral and media regulatory bodies—particularly the Australian Electoral Commission (AEC) and the Australian Communications and Media Authority—fail to adequately oversee non-English language media. While traditional and new media content in Australia is highly regulated (Cunningham and Turnbull, 2020), platform distribution has prompted unique

governmental interventions (Meese and Hurcombe, 2021; Bossio et al., 2022). Meanwhile, WeChat has emerged as a significant platform in the Australian public sphere, facilitating domestic political messaging, symbolizing perceived Chinese influence, and serving as a primary information source for Chinese-speaking communities (Hsu, 2023).

Here, the networks, systems, and standards of WeChat, as an information infrastructure (de Seta, 2023), support ethno-transnational media organizations operating through "WeChat Official Accounts" (WOAs) that circulate information and financial transactions in Australia. WeChat functions as an "extra-national" piece of PRC information infrastructure critically shaping the socio-political life of Chinese Australians.

Methods

This work builds from a program of work around Chinese-language social media monitoring launched in 2019, with aims to systematically monitor and analyse Australian politics-related public opinions on WeChat and Red (*Xiaohongshu*). We employ a computational HASS tool for the mobile investigation of platforms—the "share-capture" method—which combines manual data collection with computational data scraping (see Fordyce, 2024). We seek to develop a form of literacy aligned with the "ability to account for, intervene around, and participate in the wider socio-technical infrastructures through which data is created, stored, and analyzed" (Gray 2018, p. 1).

Over the period spanning from the 3rd of February to the 8th of December 2023, we collected a total of 3,002 items related to the Voice referendum, which included: 267 public posts from WeChat, 20 short videos published through WeChat's short-video feature "Channel" and 2,715 anonymous "reply" comments by users. Strikingly, 133 comments responded to 267 public posts and 2,582 comments responded to the 20 short videos.

We applied both quantitative and qualitative methods to analyze the dataset. Quantitative content analysis (Neuendorf, 2002) was used to examine the coverage of the Voice referendum, user support (vote Yes) or objection (vote No), and key international and domestic actors shaping the discussion. Alongside the quantitative content analysis, we counted, ranked and categorized hashtags, while also identifying correlations between variables. Our qualitative analysis involved close reading of public posts, short videos, and comments to identify the key discourses swaying political opinions during the event.

Discussion

Our analysis reveals the two key findings. Firstly, short videos emerged as a more affective and effective tool in political communication compared to text-oriented Official Accounts, although the latter remained a popular communication channel between Australian public institutions and Chinese-speaking voters. Secondly, Australian regulations are inadequate to address the complexities of modern digital media.
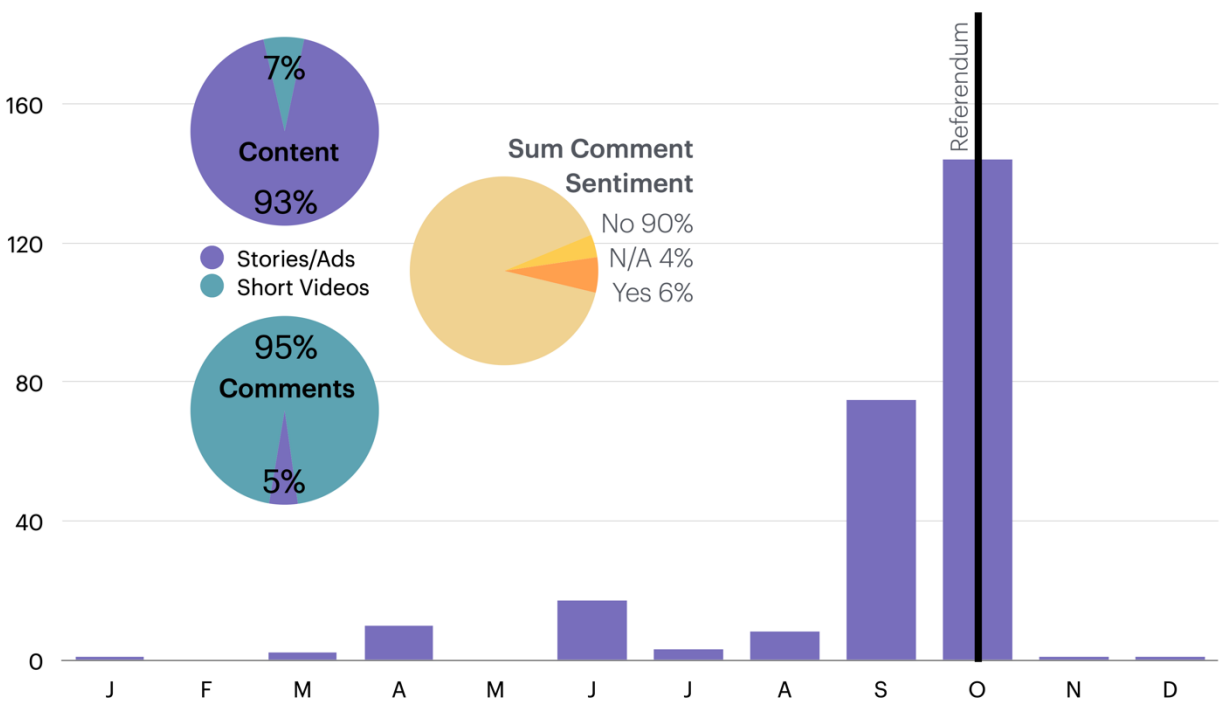
Figure 1 "Number of WOA content, comments, and their sentiment leading up to the 14 October 2024 referendum"

The first coverage of the referendum was observed in January 2023, focusing on the possibility of republicanism. By September 2023, just one month before the referendum, explicit Voice campaigns ramped up on WeChat. WeChat's coverage often mirrored Australian media, with translations from English news to Chinese WOAs as a prominent mode of engagement. Our analysis showed that the Voice was often linked to everyday topics like immigration, economy, and foreign relations to engage Chinese Australians, though it was rarely the main focus unless explicitly sponsored by the AEC and the Australian Government.

Of note, nine WOAs offered about 50% of Voice content—consistent with WeChat's decentralised content creators appealing specific audiences. The AEC published 13 sponsored articles on major WOAs to educate Chinese-speaking and correct misinformation. However, there articles were later removed post-referendum largely due to contractual agreements between the content providers and the media accounts. A Liberal-party politician, representing the electorate with a significant Chinese Australian population, subtly campaigned against the Voice by shifting the focus from the Indigenous Voice to the need to listen to Chinese migrants.

While WOAs incorporated the Voice referendum into their daily mix of news, the short videos were more explicitly focused on the referendum. We noted that content creators expressed their positions—vote Yes or No—quite regularly. The high user engagement with these videos, particularly through comments, revealed a clear political stance on the Voice, with 92% expressing support for voting No and 6% supporting Yes (2% being ambiguous or irrelevant). This was a marked contrast to the more ambiguous comments on WOA stories.

These comments and short videos that favored No votes noted existing anxieties within Chinese migrant communities. Concerns focused on the potential disruption of Australia's racial hierarchy, with fears of disempowering Chinese communities, alongside scepticism toward Albanese government regarding the possibility of increased taxation.

The question is whether the proliferation of comments on video media were organic or dis/misinformation. On one hand, these tropes align with broader trends in Australia, where the referendum was rejected at 60%, and the framing by major media outlets, particularly those owned by the Murdochs. Yet, these tropes offer a similar playbook to information operations in other western countries designed to sew discord generally, and around The Voice referendum in Australia for English X/Twitter specifically (Graham, 2024).

A smaller majority of Chinese Australians voted No than our 'organic' sentiment data suggested, while the removal of official political information from the AEC contrasted with persistent "No"-leaning political content left on public WeChat accounts.

Conclusion

Considering these WOAs as sitting upon neocolonial affect infrastructure raises important questions for future analysis. WOAs in Australia exist outside the direct control of Western technology markets or China, prompting inquiries into how to discern organic engagement or propaganda as scale and content change from manual WOA markets to more algorithmically malleable engagements with video/comment interactions. In the future research, it is important to better understand the spectrum from misinformation to political opinion expressed through the digital disenchantment (see Han 2022) of diasporas on infrastructures of affect across national bounds.

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ON THE TECHNOLOGICAL PRODUCTION OF TIME AND THE INTERPELLATION OF NETWORK PROTOCOLS

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The newly developed series of standards for network connectivity, called Time Sensitive Networking, is indicative of two things. First, how digital systems are changing our relationship to temporality as a political category and second how the production and imagination of temporalilty in the digital are informed by two distinct modes of operation of the digital infrastructures: one originating in techniques of labour discipline in scientific management and another one that we can trace back to the production of hyperreality and simulacra in the increasingly audio-visual nature of data flows within different networks.

We, as subjects, experience our relationship to and interpellation into systems of production and ideology through standardised and universalised temporal frameworks. One such example is our subjectivation as members of the imagined community of the nation, which, as Benedict Anderson (1983) argues (borrowing the concept from Walter Benjamin), is predicated on the acceptance and participation in the temporal regimes of the "homogeneous empty time" of capitalism. Practices of time, particularly in mechanisation and automation, are key for the technological constitution of subjects and structures to which these subjects are accountable and accounted for. A famous example are Frederick Taylor's experiments and E.P. Thompson's (1967) critique that sees the imposition of universal measures of time as one of the key technologies of control in capitalism, where the clock rules over the factory and the factory, in turn, rules over the daily cycles of life for the workers and their families.

Early experiments with scientific management made extensive use of the nascent medium of photography and cinematography, in the works of Edward Muybridge and Frank and Lillian Gilbreth who used a variety of ingenious cinematic techniques to document, analyse and modify the movements of workers. Their focus on constructing the perfect labour process has far-reaching effects, by driving forward the standardisation, abstraction, mechanisation and automation of labour. It is also woven into a particular regime of visibilities and invisualisations, where the standardised perfected labour process was often achieved at the expense of outsourcing all time-consuming and inefficient tasks to other workers, creating a hierarchy between efficient temporalities and what Steven Jackson refers to as the "slow underbelly of modernist stories of speed and technology" (2017: 170)

In distributed digital systems, despite the drive towards interoprability and standardisation, the possibility of universal measure of time is surprisingly hard to achieve. Time is constantly produced and negotiated through the transmission of electrical signals and data packages. Alexander Galloway (2006) writes that protocols as political technologies are realised through their enactment, and, in the case of temporality in digital networks, this enactment is also an act of participation and of

"technological interpellation" through which a field of control is constituted, in the sense that a network only exists as a relation between its nodes.

This field of control operationalises genealogies linking network time protocol to practices of labour control like the time stamp (Gordon 2021) or time-sharing, which Tung-Hui Hu (2015) sees as an important moment in the constitution of the user of computing infrastructures as a subject. But it is also defined by the material properties of media and infrastructures for transmission, in which sensor and audiovisual data are key for the enactments of temporally-situated actions (Ernst 2016; Gehl 2011; Sprenger 2022, Parrika 2017). Concepts like "real time", "time sensitive" and "time critical" are contingent on the materiality of platforms, interfaces and devices that enable these transfers (Weltevrede, Helmond & Gerlitz 2014). This new technopolitical meaning of time management extends not just to automated machines within industrial settings but, through their use, to human labour and human subjects, which are directly and indirectly implicated in the organisation of these hierarchical relations.

It also means that automation operationalises particular topologies of network time that do not coincide with notions of temporality linked to a traditional model of geopolitics. The wider known network time protocol (NTP) operates with a topology of universalised time, retaining its connection to the sociotechnical infrastructure of Coordinated Universal Time (UTC, which used to be called GMT) (Gordon 2021), a measure that is simultaneously a product of technoscience and of political imaginaries of world order and bordering. In contrast, networks of industrial automation rely on solipsistic, enclosed and hierarchicised topologies of data flows.

These kinds of differential temporalities are at the core of the standards for time-sensitive networking (TNS) developed by IEEE (The Institute of Electrical and Electronics Engineers). TSN aims to establish hierarchies between different data flows within a network and to control the sequence of data packages in the flows that are given priority. Non-TSN networks can guarantee the receiving of packets but not their exact sequence. This can be a problem in two cases: audio-video streaming and industrial robotics operating with sensor and visual data.

From the early 2000s to 2012 the working group for TSN was called Audio-Video Bridging and was focused on establishing standards for the transfer of digital audio-video data over the network with minimal loss and high determinism, i.e. accurate sequencing of transmitted packets. In these cases, any out of sequence packets can result in distorted sound or picture, which makes audio-video files far more time sensitive than other types of data. Eventually the principle of network determinism developed for audio video data transmission served as a scaffolding for addressing a wider range of use cases for deterministic networks: industrial smart robotics, autonomous vehicles, and aerospace where machines navigate their environment and interact with each other by relying on a real-time simulation of their environment based on data from sensors and cameras. In these technologies of "time critical media" (Sprenger 2022) decisions about how the machine would act need to be taken within

fractions of a second, based on input data – a timeframe that entirely precludes the possibility of human oversight and intervention.

TSN focuses on establishing relationships and temporal sequencing across nodes in the network to a greated extent than it aims to address the referentiality of these nodes to an external universal measure of time. It prioritises data flows exchanged between devices linked in the Industrial Internet of Things, such as robots, automated machinery and sensors, i.e. operational technology, where sensor and visual data needs to be rapidly transferred and processed by machines. Other types of data exchanges, for instance, ones between systems used for storing information about the operation of the warehouse, are not time-critical and do not require the same temporal urgency defined by concepts like hard real-time processing. TNS pushes a topology where the production and operationalisation of simulated environments takes priority over all other processes of exchange, communication and socialisation. This reinvented significance of the iconography of digital simulacra (Baudrillard 1994) suggests the potential to revisit the postmodernist concept of virtuality and its potential for producing political effects in the network.

At the same time, the distribution and interrelation of different notions of time in the network points to the internal contradiction of the expansion of the digital. Behind the promise of connectivity, they rub against "the revenge of the real" (to borrow a catchy phrase coined for a slightly different context by Benjamin Bratton) – the materiality of copper, silicone and air that transmits but also slows down transmission. In the quest for time-sensitive computing this leads to the proliferation of hardware solutions like edge computing and network bridges that de-virtualise the cloud and produce simultaneously its limits and its expansion. For example, Google closed its IoT Core service and instead opted for its own Tensor Processing Unit, Edge TPU. These infrastructural solutions also actively produce, hierarcherise and monitor differentiated temporalities by policing data traffic and enacting discipline onto data packet sequences and network time prioritisation. The expansion of TSN in wireless and 5G networks, for example, revives debates about net neutrality (Allera 2022). In the process, however, they also manufacture excesses and byproducts of automated efficiencies, through the proliferation of temporal notions like best effort traffic, slowness and non-time sensitivity, which further contest and fragment the topologies of network time.

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